

Additional file 1 to:

Relative contributions of non-essential Sec pathway components and cell envelope-associated proteases to high-level enzyme secretion by *Bacillus subtilis*

Jolanda Neef¹, Cristina Bongiorno², Brian Schmidt², Vivianne J. Goosens¹, Jan Maarten van Dijk^{1#}.

¹University of Groningen, University Medical Center Groningen, Department of Medical Microbiology, Hanzeplein 1, P.O. Box 30001, 9700 RB Groningen, The Netherlands

²DuPont Industrial Biosciences, 925 Page Mill Road, Palo Alto, CA 94304, United States

Table S1: Strains used in this study

<i>B. subtilis</i> strain	Relevant genotypes and phenotypes	Source or reference
Δupp	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR</i> ; Em ^R , Neo ^R	[1]
AmyE	<i>degUHy32, amyE::xylRPxylAcomK-ermC, aprE::PaprE-amyE catR Tbpn'</i> ; Em ^R ; Cm ^R	[1]
AmyL	<i>degUHy32, amyE::xylRPxylAcomK-ermC, aprE::PaprE-amyL catR Tbpn'</i> ; Em ^R ; Cm ^R	[1]
BPN'	<i>degUHy32, amyE::xylRPxylAcomK-ermC, aprE::PaprE-bpn' catR Tbpn'</i> ; Em ^R ; Cm ^R	[1]
$\Delta dnaK$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta dnaK::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta secG$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta secG::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta secDF$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta secDF::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sipS$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sipS::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sipT$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sipT::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sipU$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sipU::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sipV$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sipV::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sipW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sipW::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta sppA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta sppA::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta tepA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta tepA::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta prsW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta prsW::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study
$\Delta wprA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta wprA::specR</i> Em ^R ; Spec ^R ; Neo ^R	This study
$\Delta htrA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, \Delta upp::neoR, \Delta htrA::upp-phleoR-cl</i> Em ^R ; Phleo ^R ; Neo ^S	This study

<i>ΔhtrB</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔhtrB::upp-phleoR-cl Em^R; Phleo^R; Neo^S</i>	This study
<i>ΔyqeZ</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔyqeZ::upp-phleoR-cl Em^R; Phleo^R; Neo^S</i>	This study
<i>AmyE ΔdnaK</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔdnaK::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsecG</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsecG::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsecDF</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsecDF::upp-phleoR-cl aprE::PapE-amyE</i> <i>catR Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsipS</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsipS::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsipT</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsipT::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsipU</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsipU::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsipV</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsipV::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsipW</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsipW::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
<i>AmyE ΔsppA</i>	<i>degUHy32, amyE::xylRPxylAcomK-ermC, Δupp::neoR, ΔsppA::upp-phleoR-cl aprE::PapE-amyE catR</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study

AmyE $\Delta tepA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta tepA::upp-phleoR-cl aprE::PaprE-amyE catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyE $\Delta prsW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta prsW::upp-phleoR-cl aprE::PaprE-amyE catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyE $\Delta wprA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta wprA::specR aprE::PaprE-amyE catR$</i> <i>Tbpn'</i> <i>Em^R; Spec^R; Neo^R; Cm^R</i>	This study
AmyE $\Delta htrA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrA::upp-phleoR-cl aprE::PaprE-amyE catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyE $\Delta htrB$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrB::upp-phleoR-cl aprE::PaprE-amyE catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyE $\Delta yqeZ$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta yqeZ::upp-phleoR-cl aprE::PaprE-amyE catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta dnaK$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta dnaK::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta secG$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta secG::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta secDF$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta secDF::upp-phleoR-cl aprE::PaprE-amyL$</i> <i>catR Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta sipS$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipS::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study

AmyL $\Delta sipT$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipT::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta sipU$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipU::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta sipV$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipV::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta sipW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipW::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta sppA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sppA::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta tepA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta tepA::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta prsW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta prsW::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta wprA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta wprA::specR aprE::PaprE-amyL catR$</i> <i>Tbpn'</i> <i>Em^R; Spec^R; Neo^R; Cm^R</i>	This study
AmyL $\Delta htrA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrA::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
AmyL $\Delta htrB$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrB::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study

AmyL $\Delta yqeZ$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta yqeZ::upp-phleoR-cl aprE::PaprE-amyL catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta dnaK$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta dnaK::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta secG$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta secG::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta secDF$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta secDF::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sipS$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipS::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sipT$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipT::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sipU$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipU::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sipV$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipV::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sipW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sipW::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta sppA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta sppA::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study

BPN' $\Delta tepA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta tepA::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta prsW$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta prsW::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta wprA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta wprA::specR aprE::PaprE-bpn' catR$</i> <i>Tbpn'</i> <i>Em^R; Spec^R; Neo^R; Cm^R</i>	This study
BPN' $\Delta htrA$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrA::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta htrB$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta htrB::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study
BPN' $\Delta yqeZ$	<i>degUHy32, amyE::xylRPxylAcomK-ermC, $\Delta upp::neoR, \Delta yqeZ::upp-phleoR-cl aprE::PaprE-bpn' catR$</i> <i>Tbpn' Em^R; Phleo^R; Neo^S; Cm^R</i>	This study

Tbpn', terminator structure of *B. amyloliquefaciens bpn'*; Em^R, Erythromycin resistant; Phleo^R, Phleomycin resistant; Neo^R, Neomycin resistant; Neo^S, Neomycin sensitive; Cm^R, Chloramphenicol resistant; Spec^R, Spectinomycin resistant

Table S2: Primers used in this study

Target gene	Primer name	5'→3' nucleotide sequence
	CI2.rev	CTTCAACGCTAACTTTGAG
Chaperone		
<i>dnaK</i>	dnaK.P0	CATTCATCCTCAGGACGTGTTC
	dnaK.P1	CTATGTTGACCATTTGCTGTCACC
	dnaK.P2	CGACCTGCAGGCATGCAAGCTTTGAATAACCTCCTGCTATGTAATTATTG
	dnaK.P3	CGAGCTCGAATTCAGTGGCCGTCGCAATAATTACATAGCAGGAGGTTATTCAAGTTCCTTTTAGTGTCAGC CCCG
	dnaK.P4	TAAATCAAGCGGGTCCTCTATCAC
Translocase		
<i>secG</i>	secG.P0	CCAGCCTTGACATAAGCCCC
	secG.P1	GCCTCTGCCAGTTTTTTGATG
	secG.P2	CGACCTGCAGGCATGCAAGCTCCCATACACCTCCAGACTCAC
	secG.P3	CGAGCTCGAATTCAGTGGCCGTCGGTAATGTAGCCAGTGAGTCTGGAGGTGTATGGGGGCAATGTTTGTA TAAGGTCTG
	secG.P4	GAGAATGGTTTCAACCTCACCC
<i>secDF</i>	secDF.P0	GCACAGCTTGAAGCGGG
	secDF.P1	GGGGCCATCACTTTTATAAATACAG
	secDF.P2	CGACCTGCAGGCATGCAAGCTTATGTATATCCTCCCTTAAACCTGTGC

	secDF.P3	CGAGCTCGAATTCACTGGCCGTCGGATTCGCACAGGTTTAAGGGAGGATATACATAAAAATATCAGGCTG TCCTCTGC
	secDF.P4	CCGACAGTTTTTGCAGCG
	Signal peptidases	
<i>sipS</i>	sipS.P0	CCTGACTCGGTGGCAGAAC
	sipS.P1	CCCGCCATAGACAATGTTG
	sipS.P2	CGACCTGCAGGCATGCAAGCTCTGATTTCTCCAATAAACAACG
	sipS.P3	CGAGCTCGAATTCACTGGCCGTCGGAAGACCGTTGTTTATTGGAGGAAATCAGGATCAAGCAGCTTCCCA TTG
	sipS.P4	GCAGCCTCTGACGTGATCC
<i>sipT</i>	sipT.P0	GGCACCAGCACCTGCC
	sipT.P1	GCCCGACAGGTATTGCC
	sipT.P2	CGACCTGCAGGCATGCAAGCTAGTGTTTCCTCCTAGACAATTGCTATG
	sipT.P3	CGAGCTCGAATTCACTGGCCGTCGCAACTGACATAGCAATTGTCTAGGAGGAAACTAAACGCCTTGCT GGCCTAG
	sipT.P4	CAAGCACCTTTACGCCATCG
<i>sipU</i>	sipU.P0	GGCTTTAAGCAAACCTGAACACG
	sipU.P1	GATGTGACCCGCGTAGCG
	sipU.P2	CGACCTGCAGGCATGCAAGCTCTTCCTTCACCCGATGCTTTC

<i>sipV</i>	sipU.P3	CGAGCTCGAATTCACTGGCCGTCGGGAATTCTTAGGAAAGCATCGGGTGAAGGAAGAATGCAATGCAAA AAGAACATGG
	sipU.P4	CAGCTTGATATCTACATCTTCTCTTTGAAC
	sipV.P0	GGGCGCGTATAACCGAG
	sipV.P1	CCGAAGATGATGATGAGAGCTG
	sipV.P2	CGACCTGCAGGCATGCAAGCTGTTACTGTCTCCCTCCATCATGC
	sipV.P3	CGAGCTCGAATTCACTGGCCGTCGCAGCGTGAGCATGATGGAGGGAGACAGTAACAAAGACGCTAATTG AAGAGGCG
<i>sipW</i>	sipV.P4	CCAGCAGCTCCGACATC
	sipW.P0	GATGGACAGAATAAAACAGTGTAAGG
	sipW.P1	CTCCGAGAGATGAGCGAAAAG
	sipW.P2	CGACCTGCAGGCATGCAAGCTTGCTTTTTTTCATCCTCTTCCC
	sipW.P3	CGAGCTCGAATTCACTGGCCGTCGCCAGAAGGAAAGCGGGGAAGAGGATGAAAAAAGCACTTCAGTTGT AAACCTGGCA
	sipW.P4	GCCGGACTGGCTGAAATAC
Cell envelope-associated proteases		
<i>sppA</i>	sppA.P0	GCATGATCGGCTTATTCATGC
	sppA.p1	CGCATGCCGATCGCAC
	sppA.P2	CGACCTGCAGGCATGCAAGCTTTTTTCTCCTCCTTTTTCTCTAAACTC

<i>tepA</i>	sppA.P3	CGAGCTCGAATTCCTGGCCGTCGGAGAGAGTTTAGGAAAAGGAGGAGAAAAGAGGGGAACAATAAT GGACGCG
	sppA.P4	CGCGATCGGCGTAATGG
	tepA.P0	CGCACGGGCACGATG
	tepA.P1	CTGTCCGTTCCAGTGTACGG
	tepA.P2	CGACCTGCAGGCATGCAAGCTCTCGCTTTCATCCTTTCCG
	tepA.P3	CGAGCTCGAATTCCTGGCCGTCGCAAAGAGAACTCGGAAAGGATGAAAGCGAGTTCTTTATACCGTGA TGCCTCAG
<i>prsW</i>	tepA.P4	GGTCTGTCATTCAATTTAGACTCCAG
	prsW.P0	CCAAGGCTTCTACTGGAGTGAAG
	prsW.P1	GGTAGAAGAAAAATTAGAAAAATGATGG
	prsW.P2	CGACCTGCAGGCATGCAAGCTCAGGCAACCTCTTTCCTTTATATTC
	prsW.P3	CGAGCTCGAATTCCTGGCCGTCGGAATATAAAGGAAAGAGGTTGCCTG AAGCCGCACAGCAACCGTGC
<i>wprA</i>	prsW.P4	GCGGCAGCTGACTGACGCTG
	wprA.P0	GTAGAGCAAGCCCGTCCTG
	wprA.P1	GCGACAGGGGAACCTTACAAC
	wprA.P2	CGACCTGCAGGCATGCAAGCTGTTATCCCTCCTGCAAATAATGAATC
	wprA.P3	CGAGCTCGAATTCCTGGCCGTCGCCTTCAAGGAGATTCATTATTTGCAGGAGGGATAACCCAAAAAGC GGTGCTCG
wprA.P4	GCCGCAATCGCTGTAATC	

<i>htrA</i>	htrA.P0	GCCGCCCGGTCATCCCC
	htrA.P1	CCGATCGTTTATGTAAAAATGACG
	htrA.P2	CGACCTGCAGGCATGCAAGCTCATGTTCACTCCGTTTCTCTATT
	htrA.P3	CGAGCTCGAATTCCTGGCCGTCGAATAGAGAAACGGAGTGAACATGGACATAATGCCTCAGGCCG
	htrA.P4	GATACATCAAGCAGCAAGGCTTC
<i>htrB</i>	htrB.P0	CCGGTCCACTTTTACTGGG
	htrB.P1	CAAGCCAAATAGCCGGAATCC
	htrB.P2	CGACCTGCAGGCATGCAAGCTGTTCTTACACTCCTTTAACGGTTATTC
	htrB.P3	CGAGCTCGAATTCCTGGCCGTCGGAATAACCGTTAAAGGAGTGTAGAACGAAAAAACAAAAAGCTGA ACCCGAT
	htrB.P4	CCATCGTGACAGGAGCGTC
<i>yqeZ</i>	yqeZ.P0	CGCTGCGGTCAGAAAAGG
	yqeZ.P1	CCACATGGGCATATGCTGTC
	yqeZ.P2	CGACCTGCAGGCATGCAAGCTGGGCGGTGTATCCCTCC
	yqeZ.P3	CGAGCTCGAATTCCTGGCCGTCGCTTATTATAAAAGGAAGGAGGGATACACCGCCCATAGAAACGAGGA GAAGTTATATGGATC
	yqeZ.P4	GAACGATCCCCTGTACGACG

References

1. Neef J, Bongiorni C, Goosens VJ, Schmidt B, van Dijl JM: **Intramembrane protease RasP boosts protein production in *Bacillus***. *Microb Cell Fact* 2017, **16**(1):57-017.